daqueles músculos. A fisiopatologia desta fraqueza muscular localizada permanece ainda por esclarecer, se bem que existam alguns estudos que apontam para fenómenos de remodelação das fibras musculares, como adaptação às exageradas cargas respiratórios a que estes músculos se encontram expostos[135,207]. Estes estudos demonstrando, na fase avançada da doença, aumento da proporção de fibras de contracção lenta ou tipo I, apontam para que a hipercápnia represente um marcador de adaptação que confere maior resistência à fadiga, a troco de alguma perda da capacidade contráctil.

Adicionalmente, também não pode ser excluída da fisiopatologia da fraqueza localizada do diafragma, o papel da exposição aos corticosteróides, devido às inúmeras agudizações respiratórias que estes doentes sofrem nas fases avançadas da doença e à utilização daqueles fármacos nessas circunstâncias.

Por último, e de acordo com os nossos resultados, mais importante para a génese da hipercápnia, do que a diminuição da capacidade contráctil do diafragma, parece ser, para além do grau de obstrução brônquica, o aumento da razão $P0,1/PI_{max}$, dado que esta razão tanto reflecte a *drive* neurológica, como a reserva funcional em força dos músculos inspiratórios, disponível para o acto respiratório. Assim, encontrando-se aumentada a referida razão, pequenas diferenças, no sentido da diminuição da força diafragmática, poderão no doente com D.P.O.C. em fase avançada, ser o mecanismo promotor da falência da bomba ventilatória, com surgimento da hipercápnia.

Em nossa opinião, os resultados deste estudo têm importantes implicações na abordagem terapêutica da D.P.O.C. Referimo-nos à ventilação não invasiva, que até ao momento actual tem sido objecto de controvérsia, nesta entidade clínica[152,191]. De facto, em consonância com os nossos resultados, a diminuição da contractilidade diafragmática nos doentes hipercápnicos, associada à elevada carga inspiratória que estes doentes têm de enfrentar, poderá ser o substrato conceptual para a introdução da ventilação não invasiva, após a instalação da hipercápnia crónica. Assim sendo, esta modalidade terapêutica será iniciada com o objectivo de assistir a bomba ventilatória na eliminação do CO_2, não só mediante ajuda inspiratória, como também aliviando os músculos inspiratórios, de parte da pesada carga que têm de enfrentar. Neste âmbito, a ventilação não invasiva, efectuada eminentemente no período nocturno, permitirá uma eliminação mais eficaz do CO_2 durante esse mesmo período e também uma diminuição considerável do trabalho respiratório[102,151,201]. Estas modificações, proporcionarão, como consequência, uma readaptação do comando central da ventilação, com diminuição da *drive* central que se poderá prolongar para o período diurno, reduzindo assim a sensação de dispneia ou de esforço respiratório[157]. O mecanismo que acabámos de descrever poderá justificar os efeitos benéficos da ventilação não invasiva, no estudo de Meecham Jones *et al.*[157]. Efectivamente neste estudo, constatou-se que, quando doentes com D.P.O.C. eram sujeitos a ventilação não invasiva, se assistia a uma melhoria significativa tanto da gasometria arterial diurna, como da qualidade do sono e da qualidade de vida, comparativamente a quando eram submetidos apenas a oxigenioterapia de longa duração.

Relativamente ao fortalecimento dos músculos respiratórios, o nosso posicionamento é mais cauteloso. De facto, se a função destes músculos está preservada, como no caso dos doentes normocápnicos, não parece fazer sentido o seu fortalecimento. Pelo contrário, no caso de fraqueza muscular, importa distinguir a situação de fraqueza generalizada dos músculos esqueléticos, da de fraqueza localizada dos músculos inspiratórios. No primeiro caso, dado que a fraqueza decorre habitualmente de fenómenos de desnutrição a atitude a tomar deverá privilegiar o suporte nutricional ao invés do fortalecimento muscular, que poderá até mesmo conduzir a situações próximas do limiar de fadiga. Por último, na situação de fraqueza localizada dos músculos inspiratórios, como a detectada nos doentes hipercápnicos do nosso estudo, se a hipercápnia representar um fenómeno adaptativo conferindo protecção à fadiga; a questão

do fortalecimento dos músculos inspiratórios visando um aumento da sua contractilidade, poderia inverter esse processo de adaptação, recolocando os doentes numa posição de maior vulnerabilidade à fadiga.

Por todas estas razões, afigura-se-nos controversa a atitude terapêutica de fortalecimento dos músculos respiratórios, nos doentes com D.P.O.C., havendo necessidade de mais estudos nesta área.

CONCLUSÕES

Este estudo demonstrou como principais achados, que:

- A *drive* respiratória central estava aumentada nos doentes com D.P.O.C., independentemente de serem normocápnicos ou hipercápnicos.
- A quimiossensibilidade dos centros respiratórios avaliada pela resposta da pressão de oclusão à estimulação com CO_2 não revelou diferenças entre ambos os grupos de doentes com D.P.O.C. e também entre cada um destes e o grupo controlo, denotando inexistência de alterações na quimiossensibilidade do centro respiratório.
- A capacidade do diafragma para gerar pressões negativas intratorácicas estava reduzida nos doentes com D.P.O.C. grave e de forma particular nos hipercápnicos relativamente aos normocápnicos; não decorrendo essa disfunção exclusivamente da hiperinsuflação.
- Comparando hipercápnicos e normocápnicos com idênticos graus de hiperinsuflação, estes grupos distinguiam-se relativamente à capacidade dos músculos inspiratórios, apenas por uma menor capacidade do diafragma para gerar pressões negativas intratorácicas, denotando fraqueza localizada deste músculo. Diferiam também quanto à reserva de força inspiratória disponível para o acto respiratório, apresentando os doentes hipercápnicos menor reserva relativa, face às necessidades.
- Os métodos de avaliação dos músculos respiratórios dependentes do esforço não foram suficientemente sensíveis para detectar essas diferenças.
- Ambos os grupos de doentes com D.P.O.C. apresentaram uma função normal dos músculos expiratórios, conforme avaliado pela PE_{max}, desde que não houvesse alterações ponderais significativas, reflectindo ausência de fraqueza muscular generalizada.
- Os principais factores preditivos da P_aCO_2 em repouso foram o grau de obstrução das vias aéreas e a reserva funcional em força dos músculos inspiratórios.

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